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Oil & Gas

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Oil and Gas Conservation Commission OF THE STATE OF MONTANA

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ANNUAL REVIEW FOR THE YEAR 1968

Relating to

OIL AND GAS

Volume 12

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Annual Review for the Year 1968 Volume 12

INTRODUCTION

This is the twelfth Annual Review of drilling and producing operations in Montana.

Oil production in Montana during 1968 was 48,460,246 barrels. This was a new high for Montana production and represents an increase of approximately 39% compared to 1967. Reserves remaining in Montana fields as of January 1, 1969, are at about the same level as a year ago. This reflects a net increase of some 48,000,000 barrels or enough to offset 1968's record production. Most of the increase in reserves is attributed to secondary oil anticipated from the Bell Creek Field. Reserve increases in other fields were offset by decline and adjustments to reserves in some of the older fields. Average daily production in 1968 increased from 96,549 barrels in 1967 to 132,405 barrels.

There were 940 wells drilled in Montana during 1968. Of these 537 were exploratory and 403 were development wells. Exploratory drilling resulted in 15 oil discoveries, 13 gas discoveries and 509 dry holes. Development drilling resulted in 309 oil wells, 14 gas wells and 89 dry holes. *63.7% dry holes*

There were several significant discoveries made during 1968 in Northern Montana. Swift sandstone oil production was found at Laird Creek field; gas production from the Sunburst sandstone at Black Jack field and Sunburst sandstone oil production in the West Butte field. Activity continued in the Tiger Ridge gas field, and at year end there were 33 shut-in gas wells in the field. Considerable activity during 1969 is indicated in the Bearpaw uplift region.

Northeastern Montana was the site of several oil discoveries in the Red River dolomite at depths exceeding 12,000 feet. These include the new fields of South Brorson, Fairview and Rush Mountain. Some Red River wells had initials of 750 barrels per day or higher. Several wildcat locations were staked in this area near the year's end. Greatly increased wildcat and development activity appears assured for 1969.

Exploration and development in Central and South Central Montana continued during 1968 at about the same rate as 1967. Deeper Amsden dolomite oil was found on Mosby Dome of the Cat Creek Anticline in Central Montana.

The Bell Creek Muddy sandstone field in Southeastern Montana continued to expand and 328 wells produced 1,528,444 barrels of oil during December, 1968. A gas extraction plant at Bell Creek is expected to be operating at full capacity of about 31 MMCFG/D early in 1969. The south and southwest edges of this field have not yet been fully delineated.

Seven secondary recovery projects were commenced during 1968. Waterfloods of selected areas in the Cut Bank Field, Northern Montana, have caused a significant increase in production and additional projects are expected to be completed during 1969.

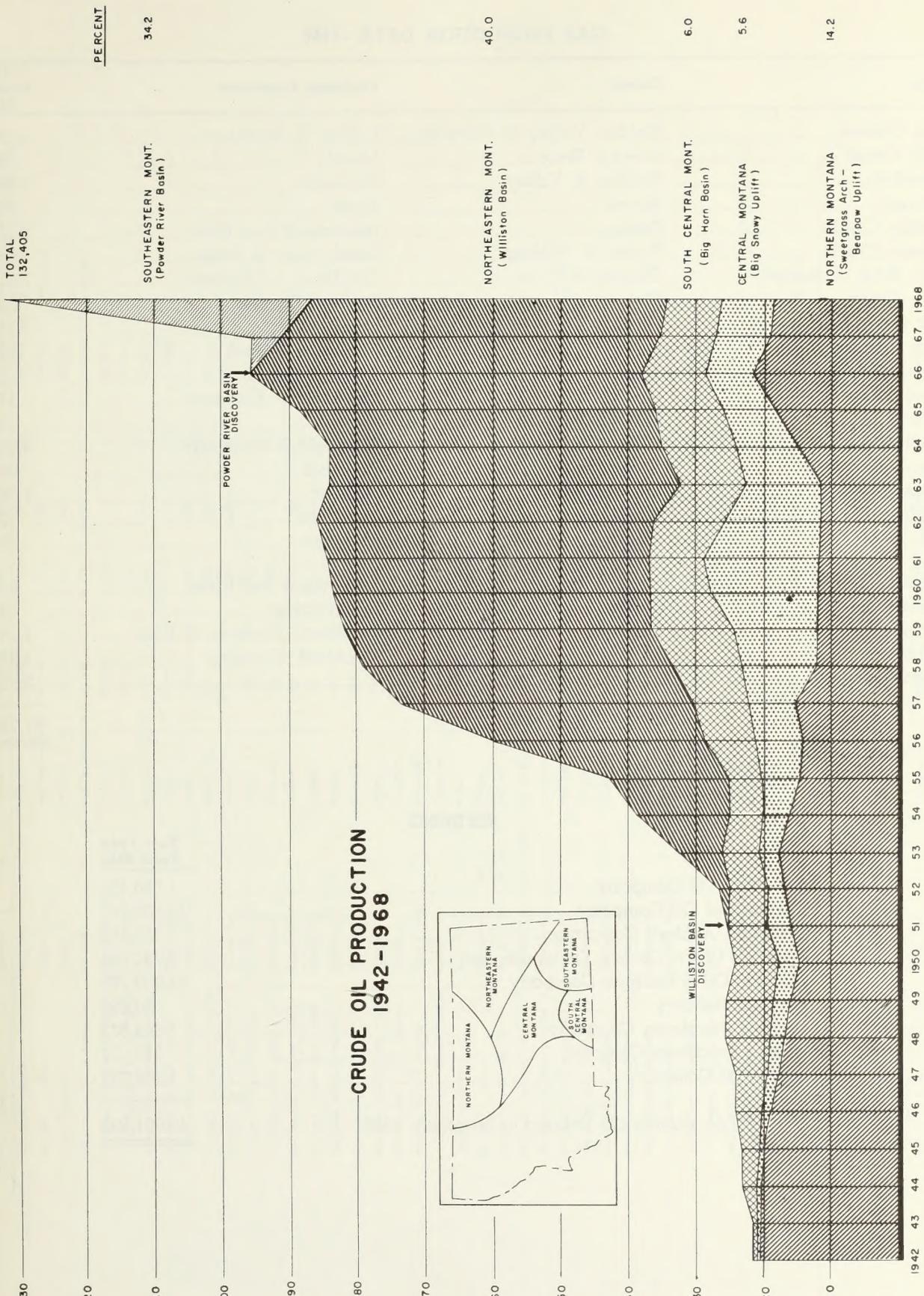
The substantial increase in oil industry interest in Montana during 1968 was dramatically indicated by the footage drilled: 4,538,711 feet, compared to 2,158,964 in 1967.

FIVE YEAR SUMMARY

	1964	1965	1966	1967	1968
Production, Northern Montana—Bbls.	5,705,948	6,826,261	7,991,302	6,758,280	6,883,493
South Central—Bbls.	3,699,927	3,597,647	3,392,890	3,181,132	2,885,272
Central—Bbls.	3,269,768	2,849,923	2,710,194	2,872,604	2,728,357
Williston Basin—Bbls.	17,971,855	19,504,287	21,285,732	20,475,733	19,390,652
Powder River Basin—Bbls.				1,671,277	16,572,472
TOTAL	30,647,498	32,778,118	35,380,118	34,959,026	48,460,246
No. of Producing Wells, Northern Montana					
South Central	2,216	2,649	2,308	2,097	1,898
Central	88	101	106	96	99
Williston Basin	317	306	301	286	282
Powder River Basin	708	754	792	802	784
TOTAL	3,329	3,810	3,507	3,390	3,391
Average Daily Production/Well—BOPD,					
Northern Montana	7.4	7.1	9.5	8.8	9.9
South Central	115.1	97.6	87.7	90.7	79.6
Central	28.8	25.5	24.7	27.5	26.4
Williston Basin	65.7	70.9	73.6	69.9	67.6
Powder River Basin				70.6	138.0
STATE AVERAGE	25.2	23.6	27.6	28.2	39.0
Development Wells Drilled, Oil Wells					
Gas Wells	100	177	179	162	300
Dry Holes	7	9	9	14	14
TOTAL	109	107	96	104	89
Exploratory Wells Drilled, Oil Wells					
Gas Wells	22	14	10	7	15
Dry Holes	3	1	3	5	13
TOTAL	150	199	185	191	509
TOTAL WELLS DRILLED	391	507	482	483	940
TOTAL FOOTAGE DRILLED	1,863,155	2,328,865	2,211,369	2,158,964	4,547,691
AVERAGE DEPTH OF ALL WELLS	4,765	4,593	4,588	4,470	4,839

SUMMARY OF DRILLING BY COUNTIES—1968
STATE OF MONTANA

County	Wildcats			Development			Total Wells Drilled	Footage Drilled	Avg. Depth Per Well
	Dry	Oil	Gas	Dry	Oil	Gas			
Big Horn	17	0	0	0	1	1	0	18	112,170
Blaine	11	1	3	2	1	1	1	19	59,902
Carbon	1	0	0	1	6	0	8	8	49,135
Carter	98	0	0	1	4	0	103	420,491	6,142
Chouteau	14	0	0	0	0	0	0	14	29,351
Custer	51	0	0	0	0	0	51	278,386	2,096
Daniels	0	0	0	0	0	1	1	7,590	5,459
Dawson	3	0	0	0	0	0	3	15,824	7,590
Fallon	3	0	0	1	3	0	7	47,600	5,275
Fergus	2	0	0	0	0	0	2	5,400	6,800
Garfield	2	0	0	1	1	0	4	11,883	2,700
Glacier	1	2	2	5	3	0	13	38,923	2,970
Golden Valley	1	0	0	0	0	0	1	1,705	2,994
Hill	8	0	0	3	1	0	5	17	1,705
Judith Basin	3	0	0	0	0	0	3	4,762	1,587
Liberty	13	1	2	8	11	2	2	37	101,574
McCone	8	0	0	0	0	0	8	44,381	2,745
Musselshell	10	0	0	6	8	0	24	110,664	5,548
Petroleum	0	0	0	4	1	0	5	14,099	4,611
Phillips	4	0	0	0	0	0	4	14,248	2,820
Pondera	4	1	0	0	10	0	0	15	43,271
Powder River	133	2	0	39	225	3	402	2,032,402	3,562
Prairie	16	0	0	1	0	0	0	17	12,754
Richland	4	2	0	2	12	0	0	20	255,086
Roosevelt	3	0	0	3	0	0	6	46,569	2,885
Rosebud	45	1	0	3	4	0	53	291,511	5,762
Sheridan	7	2	0	7	5	0	21	185,186	5,500
Stillwater	3	0	0	0	0	0	3	9,957	8,818
Teton	4	0	0	0	0	0	4	1,322	3,319
Toole	29	3	4	4	3	0	46	102,149	2,283
Treasure	1	0	0	0	0	0	1	6,394	2,221
Valley	7	0	0	0	0	0	7	35,607	6,394
Wibaux	1	0	0	0	0	0	1	7,432	5,087
Yellowstone	2	0	0	0	0	0	2	9,437	7,432
TOTALS	509	15	13	89	300	14	940	4,538,711	4,828



B.O. P.D. (THOUSANDS)

GAS PRODUCTION DATA—1968

Field	County	Producing Formations	1968 Production M.C.F.
Big Coulee	Golden Valley & Stillwater	Lakota & Morrison	1,059,012
Bell Creek	Powder River	Muddy	586,214
Bowdoin	Phillips & Valley	Colorado	1,988,908
Bowes	Blaine	Eagle	497,649
Cabin Creek	Fallon	Interlake & Red River	1,261,514
Cedar Creek	Fallon & Wibaux	Judith River & Eagle	4,821,151
Cut Bank & Reagan	Glacier & Toole	Cut Bank & Madison	7,811,914
Dry Creek	Carbon	Eagle & Frontier	359,693
Elk Basin	Carbon	Tensleep	1,149,799
Flat Coulee	Liberty	Blackleaf & Swift	104,520
Gold Butte	Toole	Swift	57,761
Grandview	Liberty	Blackleaf & Kootenai	417,264
Hardin	Big Horn	Frontier	36,068
Keith Block	Liberty	Blackleaf & Sawtooth	3,423,288
Kevin Sunburst	Toole	Kootenai	681,029
Lake Basin	Stillwater	Frontier	1,247,542
Middle Butte	Toole	Blackleaf	34,376
Mt. Lilly	Liberty	Madison	410,577
Pine	Dawson, Prairie, Fallon & Wibaux	Interlake & Red River	840,664
Plevna	Fallon	Judith River	94,433
Utopia	Liberty	Blackleaf, Kootenai & Ellis	1,141,797
Whitlash	Liberty	Blackleaf, Kootenai	1,210,185
Miscellaneous			2,054,382
TOTAL ALL FIELDS			<u>31,289,740</u>

REFINING

	Year 1968 Total Bbls.
Big West Oil Company	1,290,452
Continental Oil Company	13,833,787
Diamond Asphalt Company	173,188
Farmers Union Central Exchange, Inc.	7,796,561
Humble Oil & Refining Company	14,059,738
Jet Fuel Refinery	30,096
Phillips Petroleum Company	1,689,672
Tesoro Petroleum Company	819,517
Union Oil Company	1,258,382
TOTAL Barrels Oil Refined in Montana, 1968	
	<u>40,951,393</u>

SUMMARY OF ACTIVE SECONDARY RECOVERY PROJECTS
(DATE EFFECTIVE TO JANUARY 1, 1969)

Field, Formation	Operator	Type of Project	Injection Pattern	Date Injections Commenced	Cumulative Injections 1000 Bbls. or MMcf	Avg. Daily Injection Rate	No. of Injection Wells	Source of Injection Media & Remarks
Ash Creek, Shannon Big 4 all, Tyler B	McDermott	Waterflood	Peripheral	10-15-64	552	304	4	Parkman, Data for Montana portion
Bowers, Sawtooth	Texaco, Inc.	"	Modified Peripheral	8-20-66	4,253	5,480	2	Produced water from Amden & Tyler
Cabin Creek, Siluro-Ordovician	Shell Oil	"	Dispersed Pilot	5-23-61	2,711	1,220	4	Madison
Cat Creek, 1st & 2nd CC (Unit 1)	Continental Oil	"	Modified Peripheral	6-12-59	30,882	24,191	25	Produced Water & Fox Hills
Cat Creek, 1st & 2nd CC (Unit 2)	Continental Oil	"	Peripheral	10-10-62	6,535	0	4	Third Cat Creek
Coral Creek, Siluro-Ordovician	Shell Oil	"	Peripheral	12-1-59	15,771	0	4	Third Cat Creek
Cut Bank, NE Unit, Cut Bank	Texaco, Inc.	"	Modified Peripheral	4-67	3,400	..	7,764	12
Cut Bank, NE Unit, Cut Bank	Phillips Pet.	"	5-Spot	9-2-63	7,817	4,125	31	Madison
Cut Bank, NE Unit, Cut Bank	Humble Oil	"	5-Spot	1-20-62	9,766	3,670	23	Madison
Cut Bank, So. Central, Cut Bank	Union Oil	"	5-Spot	5-33	13,008	6,837	36	Madison
Cut Bank, SE Unit, Cut Bank	Texaco, Inc.	"	5-Spot	4-62	19,866	12,300	51	Madison
Cut Bank, SE Unit, Cut Bank	Phillips Pet.	"	5-Spot	9-62	11,859	22,411	118	Madison
Cut Bank, Tribal, Lander	Humble Oil	"	Dispersed	6-51	4,759	0	2	Eagle
Cut Bank, H. C., Lander, Lander	Humble Oil	"	Dispersed	4-65	762	606	2	Eagle
Cut Bank, Lander Sand, Lander	Texaco, Inc.	"	Dispersed	7-64	2,016	1,709	6	Eagle
Cut Bank, McGuinness-Moulton	Union Oil	"	Dispersed	12-62	1,625	527	1	Madison
Cut Bank, Moulton	Union Oil	"	Dispersed	8-68	516	4,682	6	Madison
Cut Bank, Two Medicine, Cut Bank	Hawaiian Oil	"	5-Spot	12-67	3,237	11,379	63	Madison
Darling, State Unit, Moulton	B. G. & O. Co.	"	Dispersed	2-67	395	4,644	1	Madison
Darling, NE Unit, Moulton	Ralph E. Fair	"	Dispersed	2-68	436	1,303	3	Madison
Darling, South, Swenson, Moulton	B. G. & O. Co., Dover, Ratcliffe	"	Dispersed	2-67	1,166	2,505	5	Madison
Elk Basin, Frontier	Phillips	"	Pilot	10-68	24	296	1	Produced Water
Elk Basin, Embarr-Tensleep	Pan American	Gas Inj.	Crestal	1926	All injection wells in Wyoming			
Elk Basin, Madison	Pan American	Gas Inj.	Crestal	1949	All injection wells in Wyoming			
Elk Basin, NW Unit, Frontier	Sinclair Oil	Waterflood	Peripheral	1962	21,339	10,889	5	Madison
Elk Basin, NW Unit, Tensleep	Sinclair Oil	"	Modified Peripheral	5-67	349	656	1	Produced Water-Hudson
Keg Coulee West, Tyler B	Pan American	"	Modified Peripheral	8-31-66	1,506	2,048	2	Madison
Kevin-Sunburst, Madison	Cardinal Petroleum	"	Dispersed	9-63	435	175	2	Madison
Kevin-Sunburst, Madison	Lon Crumley	"	Peripheral	10-57	4,367	1,161	5	Madison
Kevin-Sunburst, Madison	Texaco, Inc.	"	Peripheral	8-64	2,967	2,095	10	Madison
Kevin-Sunburst, Madison	Juniper Oil	"	Dispersed	8-64	795	1,180	8	Madison
Kevin-Sunburst, Madison	Pioneer	"	Dispersed	6-65	535	326	7	Madison
Little Beaver, Siluro-Ord.	Shell Oil	"	Semi-Peripheral	8-7-66	5,845	5,514	12	Minneusa
Little Beaver East, Siluro-Ord.	Shell Oil	"	Semi-Peripheral	4-65	3,211	2,797	5	Minneusa
Pine, North, Siluro-Ord.	Farmers Union	"	Dispersed	7-67	433	957	5	Third Cat Creek
Pine, South, Siluro-Ord.	Shell Oil	"	Dispersed	5-68	17	79	5	Third Cat Creek
Pondera, Madison	Phillips Pet.	"	Dispersed	8-61	516	4,632	6	Madison
Ragged Point, Tyler A	Juniper Oil	"	Modified Peripheral	2-3-66	2,026	1,220	4	Third Cat Creek
Rasman, Madison	Union	Gas Inj.	Crestal	8-61	2,485	1,143	2	Produced Gas
Red Creek, Cut Bank	Humble Oil	Waterflood	5-Spot	6-65	3,375	3,403	9	Madison
Richey Sy., Dawson Bay-Interlake	Sinclair Oil	"	Dispersed	12-65	1,197	1,267	4	Fox Hills
Svenssas, Tyler B	Pan American	"	Peripheral	2-63	9,998	7,889	5	Mission Canyon
Sumatra, West, Tyler	Conoco	"	Peripheral	10-68	785	4,371	4	Mission Canyon

OIL AND GAS DISCOVERIES IN 1968

County	Operator—Well Name and Location	Field	Total Depth	Initial Oil B/D	Initial Potential Gas MCF	Producing Formation
Blaine	High Crest, Morphew 31-1, NE NE 31-32N-18E	Tiger Ridge	4,113	50		Sawtooth
Blaine	High Crest, State 16-2, SW NE 16-30N-18E	Tiger Ridge	2,042		5,000	Judith River
Blaine	General Crude, Henderson 1, SW SW 27-27N-17E	Unnamed	2,358		1,250	Eagle
Blaine	Gulf Oil Corp., Federal 15-1, NE SW 15-25N-20E	Unnamed	1,987		974	Eagle
Glacier	Montana Power, Thelen 1, NW SE NE 13-37N-9W	Londslide Butte	4,725	25		Sun River
Hill	High Crest, Anderson 30-1, NE SW 30-31N-16E	Tiger Ridge	1,601		1,500	Eagle
Hill	Golden Eagle, Sands 15-1, NE SW 15-32N-15E	Squaw Coulee	1,271		1,300	Eagle
Hill	Oil & Gas Futures, Rocky Boy 1-31, NW SW 31-30N-15E	Unnamed	2,500		500	Judith River
Liberty	NPRR-McGregor, Corcoran-Gray 14-26, SW SW 26-37N-5E	Laird Creek	2,770	108		Swift
Liberty	Rossmiller, Govt. 1, NW NW 2-36N-5E	Black Jack	2,447		1,230	Sunburst
Liberty	NPRR-McGregor, Jensen "C" 32-34, SW NE 34-37N-5E	Black Jack	2,600		2,510	Sunburst
Petroleum	Farmers Union, State 8, SW SW 16-15N-30E	Cat Creek	3,998	50		Amsden
Pondera	Balcon, Tatman 1, NW NE 12-27N-3W	Unnamed	1,707	5		Sunburst
Powder River	Alpine, Federal-Sawtooth 1, SW SE 17-65-53E	South Brorson	12,560	744		Muddy
Richland	Woods Petr., Dynneson 1, SE NW 7-23N-58E	Fairview	12,850	930		Red River
Richland	Consolidated, Young Heirs 1, NW NE 31-25N-59E	Bell Creek	4,845	103		Red River
Rosebud	Cardinal, Federal 11-20, NE SW 20-9S-53E	Injun Creek	6,035	175		Muddy
Rosebud	BG&O Co., Midkiff 1, SW SW 8-9N-32E	Goose Lake	6,916	125		Tyler
Sheridan	Signal, Nordhagen 1, NW NW 36-36N-58E	Rush Mountain	12,038	316		Ratcliffe
Sheridan	Sinclair, Hoffelt 1, SE SW 32-32N-59E	Fred & George	2,772	11		Red River
Toole	Sumatra Oil, USA 32-11, SE SW NE 11-37N-2E	Unnamed	2,615	70		Sunburst
Toole	Grannell, Clark-Beaudoin 13-5, SE SW 5-37N-2E	Unnamed	1,658		1,710	Sunburst
Toole	Batts-Bolack, Weigan 1-226, SE NW 6-31N-2E	West Butte	2,463	240		Bow Island
Toole	Fulton et al., Berthelote 22-8, SE NW 8-36N-2E	West Butte	2,706		13,500	Sawtooth-Madison
Toole	Fulton et al., Federal 31-8, NW NE 8-36N-2E	Arch Apex	1,975		314	Bow Island

UNNAMED OIL AND GAS AREAS

County	Location	Producing Formation	No. Wells	Status
Blaine County	Sec. 15, T. 25N, R. 20E.	Eagle	1	(Shut-in) Gas
Blaine County	Sec. 27, T. 27N, R. 17E.	Eagle	1	(Shut-in) Gas
Carter County	Sections 6 & 7, T. 8S., R. 55E.	Muddy	2	(Shut-in) Gas
Daniels County	Sec. 26, T. 35N, R. 48E.	Rotcliff	2	Oil
Hill County	Sec. 31, T. 30N, R. 15E.	Judith River	1	(Shut-in) Gas
Pondera County	Sec. 12, T. 27N, R. 3W.	Sunburst	1	Oil
Richland County	Sec. 11, T. 24N, R. 55E.	Red River	1	Oil
Toole County	Sec. 5, T. 37N., R. 2E.	Sunburst	1	Oil
Toole County	Sec. 6, T. 31N., R. 2E.	Bow Island	1	Gas
Toole County	Sec. 14, T. 36N, R. 2E.	Sunburst ?	1	Oil

OIL AND GAS FIELDS

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
ANTELOPE Swift (U. Jur.)	4	Structural	Water Drive	(Listed as part of Cat Creek Field)	None
ARCH APEX Bow Island (L. Cret.) Gas Swift (Jurassic) Gas (Shut-in)	16 1	Strat. Strat.	Volumetric Volumetric	330' from legal subdivision; 2400' from any other drilling or producible gas well producing from the same reservoir; 75' topographic tolerance. (Order 4-60.) (Sometimes called Colorado Blackleaf pool.) (Swift) State-wide.	None
ASH CREEK Shannon (U. Cret.)	3	Structural	Partial Water Drive and Depletion	Spacing waived within unitized portion of field except no well may be drilled closer than 660' from unit boundary. (Order 4-65.)	Waterflood started October, 1964. (Orders 22-64, 15-66.)
BANNATYNE Swift (U. Jur.)	2	Structural	Comb. Water Drive and Volumetric	Center of 10-acre tracts, 50' topographic tolerance. Commencing permitted. (Order 20-58.)	Pilot waterflood of Swift suspended in 1963.
BASCOM Sun River (U. Miss.)	2	Structural			
BEARS DEN Amsden (Penn.) Tyler (L. Penn.)	1	Strat. Struct.-Strat.	Water Drive Depletion	State-wide. (Order 10-63.)	None
BELL CREEK Muddy (L. Cret.)	328	Strat.	Depletion	40-acre spacing units with location 660' from unit boundary with 150' tolerance for topographic reasons only. 300 barrel per well per day MER. Semi-annual bottom-hole pressure surveys. Quarterly gas-oil ratio tests. (Orders 37-67, 39-67, 50-67, 1-69.) Gas extraction plant.	None

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
BENRUD Nisku (Dev.)	1	Structural	Water Drive	160-acre spacing units with permitted location within a 1320' square in center of quarter section. (Order 6-65.)	Water disposal into Judith River formation. (Order 64-62, 32-66.)
BENRUD, EAST Nisku (Dev.)	1	Structural	Water Drive	Same as Benrud Field. (Order 6-65.)	Water disposal into Judith River formation. (Order 64-62, 32-66.)
BENRUD, NORTHEAST Nisku (Dev.)	1	Structural	Water Drive	Same as Benrud Field. (Order 6-65.)	Water disposal into Judith River formation. (Order 64-62, 32-66.)
BERTHELOTE Sunburst (L. Cret.)	1	Strat.	Depletion	40-acre spacing units with well no closer than 330' from lease or property line and not closer than 660' between wells. (Order 18-66.)	None
BIG COULEE 3rd Cat Creek (L. Cret.) Gas Morrison (U. Jur.) Gas	3	Structural Structural	Water Drive Water Drive	State-wide.	None
BIG WALL Amsden (Penn.) Tyler (Penn.)	2	Structural	Water Drive	Spaced by old state-wide spacing; 330' from lease or property line, 990' between wells in same reservoir. (Order 12-54.)	Previous disposal into Tyler "A," stopped in 1961. Water-flood of Tyler "B" sand started Aug., 1966. (Order 22-66.)
BLACKFOOT Cut Bank (L. Cret.) Sun River (Miss.)	6	Structural	Water Drive	One well only per 40-acre spacing unit. 300' tolerance from center of spacing unit. Dual completion in Cut Bank and Madison with administrative approval. (Order 3-57.)	None
BLACK JACK Sunburst (L. Cret.) Gas	3	Strat.	Depletion	One well per 160-acres, no closer than 660' from boundary of each unit. (Order 3-69.)	None

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
BORDER Cut Bank (L. Cret.) Oil & Gas	3	Strat.	Depletion	Oil: 220' from boundary of legal subdivision and 430' between wells in same formation; 75' topographic tolerance. Gas: 330' from boundary of legal subdivision, 2400' between wells in same formation on same lease. 75' topographic tolerance. (Order 7-54.)	None
Moulton (L. Cret.) Oil & Gas	18	Strat.	Depletion		
BOWDOIN Bowdoine & Phillips sands in Colorado shale (U. Cret.) Gas	346	Structural	Volumetric	One well per quarter section not less than 1000' from lease boundary or less than 2000' from any gas well in same horizon. (Order 29-55.)	None
BOWES Eagle (U. Cret.) Gas	19	Structural	Volumetric	660' from boundary of legal subdivision, 1320' from other wells in same formation. 75' topographic tolerance. (Order 23-54.)	None
Sawtooth (M. Jur.)	58	Structural	Partial Water Drive	330' from lease or property line, 990' between wells in same formation. (Order 13-54.)	Pilot waterflood initiated in 1961 and expanded to field-wide waterflood in 1965. (Order 5-61.) Water from Madison.
BRADLEY Sun River (Miss.)	2	Structural	Water Drive	State-wide.	None
BRADY Sunburst (L. Cret.)	3	Strat.	Depletion, Partial Water Drive	10-acre spacing units with 75' topographic tolerance from center of spacing unit. (Order 34-62, 55-62.)	None
BRORSON Mission Canyon (Miss.) Oil & Gas	1	Structural	Volumetric, Water Drive	One well per 160-acre unit, no closer than 660' from boundary (Mission Canyon); 990' Red River. (Order 21-68, 27-68.)	None
BRORSON, SOUTH Red River (Ord.) Oil & Gas	3	Structural	Volumetric, Water Drive	One well per 160-acre unit, no closer than 660' from unit boundary. (Order 26-68.)	None

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
CABIN CREEK Mission Canyon (Miss.)	21	Structural	Water Drive, Depletion	Spacing waived and General Rules No. 213 (Deviation), 218 (Commingling), and 219 (Dual Completion) are suspended until present Unit Agreement becomes inoperative. (Order 36-62.) Many wells produce from both Interlake & Red River by dual completion.	Waterflood of Siluro-Ordovician reservoir has been expanded to a full scale peripheral flood. (Orders 60-62, 30-63.)
Interlake (Sil.)	7	Structural	Water Drive, Depletion		
Red River (Ord.)	78	Structural	Water Drive, Depletion		
CAT CREEK Kootenai (L. Cret.) (3 sands) Morrison (U. Jur.)	42	Structural-Strat.	Water Drive	220' from lease or property line, 440' from every other well in same formation. (Order 17-55.) Five separate producing areas, East, Antelope, Mosby, West and Landheim Domes.	Three Kootenai waterfloods and one Ellis waterflood in progress. (Orders 17-56, 18-59, 13-62, 8-68.) Water from Third Cat Creek sand.
Ellis (U. Jur.) (Same as Swift sand)	2	Structural-Strat.	Water Drive		
Amsden (Penn.)	27	Structural	Depletion-Water Drive		
	1 /	Structural-Strat.	Water Drive	State-wide.	
CEDAR CREEK Judith River (U. Cret.) Gas	176	Structural	Volumetric	1200' from legal subdivision line, 2400' from every other well in same formation. (Order 33-54.)	None
Eagle (U. Cret.) Gas	60	Structural	Volumetric	320-acre spacing units. Wells in center of NW 1/4 and SE 1/4 of each section with 200' topographic tolerance. (Order 1-61.)	None
CLARKS FORK Frontier (U. Cret.)	1	Structural-Strat.	Depletion	330' from quarter-quarter section line, 1320' between wells with 75' topographic tolerance. (Order 17-54.)	None
CONRAD, SOUTH Dakota (L. Cret.) (Shut-in)	1	Strat.	Depletion	10-acre spacing units. Wells in center of each unit with 75' topographic tolerance. (Orders 34-62, 31-63.)	None
CUPTON Red River (Ord.)	1	Structural-Strat.	Water Drive	80-acre spacing units consisting of E 1/2 and W 1/2 of quarter section; well location in SE 1/4 and NW 1/4 of quarter section with 75' topographic tolerance. (Order 31-55.)	None

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
CUT BANK Kootenai (L. Cret.) Oil & Gas (Gas Only)	729 170	Strat.	Depletion	(Kootenai formation includes Moulton, Sunburst, and Cut Bank sands.) Oil: 330' from legal subdivision line. 650' between wells in same formation. 5-spot on 40-acre tract permitted. 75' topographic tolerance. (Order 10-54.) Gas: 330' from legal subdivision, 2400' between wells in same formation. 75' topographic tolerance. (Order 10-54.)	There are 15 waterfloods in progress. Water from Eagle and Madison, or produced.
Madison (Miss.) Oil & Gas (Gas only)	31 2 (?)	Strat.	Water Drive		
DARLING (Included as part of Cut Bank Field)					
DEAN DOME Greybull (L. Cret.) Gas Oil	1	Structural	Water Drive	State-wide. Oil ring below gas cap. One each shut-in gas and oil well.	None
DEER CREEK Interlake (Sil.) Red River (Ord.)	2 1	Structural	Water Drive	80-acre spacing units consisting of any two adjacent quarter-quarter sections. Well location in NE 1/4 and SW 1/4 of each quarter section with 75' topographic tolerance. (Orders 23-55 & 14-59.) Commencing of production permitted upon approval of Comm. Petr. Engr. (Order 18-63.)	Excess produced water is disposed into Dakota and Lakota formations. (Orders 6-56 & 3-58.) Two Silurian wells shut-in.
DELPHIA Amsden (Penn.)	1	Structural	Water Drive	State-wide.	None
DEVIL'S BASIN Heath (U. Miss.)	5	Structural	Depletion	State-wide.	None
DEVON Blackleaf, (L. Cret.) Gas	(Shut-in)	Strat.	Volumetric Depletion	State-wide. State-wide.	None None
DRY CREEK Eagle (U. Cret.) Gas	1	Structural-Strat.	Volumetric	State-wide.	None.
Frontier (U. Cret.) Gas Greybull (L. Cret.) Gas, some oil	6 1	Structural-Strat.	Volumetric-Depletion	Volumetric-Depletion	Six additional gas storage wells, west end of structure.

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
DUNCAN GREEK Muddy (L. Cret.)	1	Structural-Strat.	Depletion	State-wide.	None
DWYER Ratcliffe (Miss.)	14	Structural-Strat.	Water Drive-Volumetric	160-acre spacing units; well location in $SE\frac{1}{4}$ of spacing unit with 75' topographic tolerance. (Orders 25-60, 29-61.)	Produced water disposed into Dakota formation. (Order 26-63.) Waterflood (Order 20-68.)
EAST KEITH & KEITH Bow Island (L. Cret.) Gas Sawtooth-Madison (Jur.-Miss.) Gas 2	11	Structural	Water Drive	State-wide, except unitized portions spaced by (Order 22-62.)	Frontier: Crestal gas injection. Embar - Tensleep: Pressure maintenance by crestal gas injection. Waterflood approved in 1966. (Order 5-66.) Madison: Water injection.
ELK BASIN (Mont. Portion) Frontier (U. Cret.) Dakota (L. Cret.) Embar-Tensleep (Perm., Penn.) Madison (Miss.)	7 3 21 20	Structural Structural Structural Structural	Gravity Drainage Gravity Drainage Gravity Drainage Water Drive	Rule No. 203 (Spacing) is waived within Unit Area. (Order 10-61.)	Frontier: Waterflood in progress. Embar-Tensleep: Waterflood and gas injection in progress. (Order 3-67.) Madison, produced water.
ELK BASIN, NORTHWEST Frontier (U. Cret.) Embar-Tensleep (Perm., Penn.) Madison (Miss.)	6	Structural	Depletion	Spacing waived within unitized portion except that bottom of hole be no closer than 330' from unit boundary and there be at least 1320' surface distance between wells in same formation; 75' topographic tolerance. (Orders 43-63, 28-64.)	Frontier: Waterflood in progress. Embar-Tensleep: Waterflood and gas injection in progress. (Order 3-67.) Madison, produced water.
ETHRIDGE Swift (U. Jur.) Gas	6	Strat.	Water Drive	State-wide, except two wells by (Order 28-65).	None
FAIRVIEW Winnipegosis (Dev.) Red River (Ord.)	1 10	Structural Structural	Water Drive Water Drive	160-acre spacing unit. Well location anywhere in spacing unit but no closer than 660' from unit boundary. (Orders 48-65, 1-67, 43-67, 44-67.) Gas used on lease and for drilling.	None
FERTILE PRAIRIE Red River (Ord.)	2	Structural-Strat.	Water Drive	80-acre spacing units consisting of north-south rectangular units. Well location in $NW\frac{1}{4}$ and $SE\frac{1}{4}$ of quarter section with 75' topographic tolerance. (Orders 3-56, 7-62.)	None

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
FLAT COULEE Bow Island (L. Cret.) Gas	1	Structural and Strat.	Depletion	330' from boundary of legal subdivision and 1320' from other wells in same reservoir. (Order 16-55.) State-wide, exception Order 11-66.	None
Dakota (L. Cret.) Gas	1	Strat.	Depletion		
Swift (Jur.) Gas	Shut-in	Strat.	Depletion		
Swift (Jur.) Oil	34	Strat.	Depletion	State-wide gas spacing.	
Sawtooth (Jur.) Gas	1	Strat.	Depletion	40-acre spacing units. Well in center of spacing unit with 150' topographic tolerance. Orders 16-62, 19-63.) State-wide.	
FLAT LAKE Ratcliffe (Miss.)	57	Structural-Strat.	Partial Water Drive	160-acre spacing units; well location in center of NE 1/4 of quarter section with 200' topographic tolerance. Wells no closer than 961' to No. Dakota state line and no closer than 1600' to Canadian line. (Orders 10-65 amended, 43-65, 23-66, 33-66.)	Excess salt water disposed into Muddy, Dakota, or Lakota formations. (Orders 39-64, 39-66.)
FLAT LAKE, SOUTH Ratcliffe (Miss.)	2	Structural-Strat.	Partial Water Drive	Same as Flat Lake spacing (Order 2-67.)	Excess salt water disposed into Muddy, Dakota, or Lakota. (Order 19-67.)
FRANNIE (Mont. Portion) Tensleep (Penn.)	2	Structural	Comb. Water Drive and Gravity Drainage	10-acre spacing units; well location in center of each unit with 100' topographic tolerance. (Order 35-63.)	None
FRED & GEORGE CREEK Sunburst (L. Cret.) Oil & Gas	24	Strat.	Depletion	Oil: 40-acre spacing units; well location in center of unit with 250' topographic tolerance. (Orders 29-63, 1-65.)	None
Swift (U. Jur.) Oil & Gas	19	Strat.	Depletion	State-wide.	
GAGE Amsden (Penn.)	1	Structural	Water Drive	State-wide.	None
GAGE, SOUTHWEST Amsden (Penn.)	(Shut-in)	Unknown	Water Drive	Temporary 160-acre spacing expired. State-wide spacing now applies. (Order 50-65.)	None

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
GAS CITY Red River (Ord.)	22	Structural	Depletion-Water Drive	80-acre spacing units consisting of E 1/2 and W 1/2 of quarter sections; well location in NW 1/4 and SE 1/4 of quarter section; 150' topographic tolerance. Spacing waived and state-wide rules 213 (Deviation), 218 (Commingle) and 219 (Dual Completion) are waived in unitized portion of field. (Order 29-62.)	Excess produced water disposed into Judith River formation. (Orders 32-61, 20-64.)
GLENDIVE Red River (Ord.)	15	Structural-Strat.	Depletion-Water Drive	80-acre spacing units consisting of any two adjacent quarter-quarter sections; wells located in center of NE 1/4 and SW 1/4 of each quarter section with 75' topographic tolerance. (Orders 27-55, 19-62, 58-62, 20-66.)	Excess produced water disposed into Swift and Dakota formations. (Orders 16-56, 16-63.)
GOLD BUTTE Swift (U. Jur.) Gas	1	Structural	Water Drive ?	640-acre spacing, well location any quarter-quarter section cornering on center of section. (Order 26-59.)	None
GOOSE LAKE Ratcliffe (Miss.)	34	Structural-Strat.	Partial Water Drive	160-acre spacing units; well locations according to areas: Area I center of NW 1/4 of quarter section; Area II, center of SE 1/4 of quarter section; Area III, center of NE 1/4 of quarter section, 200' topographic tolerance. (Orders 42-63, 40-66, 47-67, 16-68.)	Excess produced water disposed into Mission Canyon and Dakota formations. (Orders 12-64, 14-66, 12-68.)
GRABEN COULEE Sunburst (L. Cret.)	1	Structural-Strat.	Depletion	40-acre spacing units; well location no closer than 330' from legal subdivision.	None
Cut Bank (L. Cret.)	20	Structural-Strat.	Depletion	(Cut Bank and Madison) Oil: 330' from boundary of legal subdivision and 650' from other well in same reservoir and on same lease. 75' topographic tolerance. (Order 73-62.)	
Cut Bank-Madison (Dual)	17	Structural-Strat.	Depletion		
Madison (Miss.)	7	Structural-Strat.	Depletion		
GRANDVIEW Bow Island (L. Cret.) Gas (2 Zones)	2	Structural	Unknown	320-acre spacing units aligned in a north-south direction; well locations no closer than 660' to a spacing unit boundary. (Order 49-67.)	None
Madison (Miss.) Gas	1	Structural	Unknown	Oil: State-wide. (3 shut-in wells.)	

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
GYPSY BASIN Sunburst (L. Cret.) Oil & Gas	1	Structural-Strat.	Comb. Water Drive and Depletion	330' from lease lines and 660' between wells in same formation. Only two wells per quarter-quarter section. (Order 7-66.)	Order 6-64 permits injection of excessive gas (produced with oil) into the Sunburst gas cap.
Swift (U. Jur.)	1	Structural-Strat.	Comb. Water Drive and Depletion	Same as Sunburst.	
Sawtooth-Madison Oil & Gas (Jur. & Miss.)	2	Structural-Strat.	Comb. Water Drive and Depletion	(Sawtooth-Madison) Oil: 40-acre spacing units; wells no closer than 330' from lease line. (Order 7-66.) (Sawtooth-Madison) Gas: 160-acre spacing units; well locations in center of any quarter-quarter section in each 160-acre unit, 2340' between gas wells, 150' topographic tolerance. (Order 13-59.)	
HARDIN Frontier (U. Cret.) Gas	48	Strat.	Volumetric	State-wide.	None
HIAWATHA Tyler (L. Penn.) (2 Sands)	9	Structural-Strat.	Depletion	State-wide.	None
HIBBARD Amsden (Penn.)	1	Unknown	Water Drive	State-wide.	None
INJUN CREEK Tyler (Penn.)	1	Strat.	Depletion	State-wide.	None
IVANHOE Morrison (U. Jur.)	2	Structural and Strat.	Depletion	40-acre spacing unit for production from any one common formation; well location in center of unit with 200' topographic tolerance. (Order 7-60.)	Waterflood of Tyler B & C discontinued.
Amsden (L. Penn.)	1	Structural and Strat.	Water Drive		
Tyler (L. Penn.)	7	Structural and Strat.	Depletion		

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
KEG COULEE Tyler (Penn.) Oil & Gas	21	Strat.	Depletion	40-acre spacing in southwest portion of field except that spacing is waived in unitized portion. (Orders 3-64, 4-64, 23-64.) 80-acre spacing in remainder of field with variable pattern. (Orders 11-60, 28-62.) Topographic tolerance varies from 100' to 150'. (Orders 11-60, 4-64, 23-64.) Buffer zone waived. (Order 16-65.) Gas to extraction plant in Sumatra field.	A waterflood of Tyler C sand in the unitized northwest portion of the field was commenced in Aug., 1967. (Orders 3-64, 28-66.) Madison water injected.
KEG COULEE, NORTH Tyler (Penn.)	7	Strat.	Depletion	40-acre spacing units; well location in center of spacing unit with 150' topographic tolerance. (Order 46-64.) Buffer zone waived. (Order 16-65.) Gas to extraction plant.	None
KEITH (See East Keith)					
KELLEY Tyler (Penn.)	5	Strat.	Depletion	State-wide, 250' tolerance. (Order 15-67.)	None
KEVIN-SUNBURST Sunburst (L. Cret.) Oil & Gas	600+	Strat.	Depletion	9 wells per 40-acre tract; only 3 wells on any side of tract set back at least 220' from line. Field delineated by Orders 8-54, 28-55. (Estimated 400 wells shut-in.)	There are four waterfloods in operation, using Madison water.
LAIRD CREEK Swift (U. Jur.) Oil & Gas	13	Strat.	Depletion	State-wide. One shut-in gas well.	None
LAKE BASIN, NORTH Eagle, Frontier (U. Cret.) Gas	2	Structural	Unknown	640-acre gas spacing units consisting of one section. Well locations in center of NW 1/4 or SE 1/4 of each section with 75' topographic tolerance. (Order 6-58.)	None
LANDSLIDE BUTTE Sun River (Miss.)	2	Unknown	Water Drive	State-wide.	None
LISCOM CREEK Shannon (U. Cret.) Gas (Shut-in)	5	Structural-Strat.	Depletion Water Drive	Spacing, one well per 640 acres within 40-acre square centered SE NW (T. 1 N.,) and SE 1/4 (T. 2 N.,). (Order 5-67.)	None

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
LITTLE BEAVER (Mont. Portion) Red River (Ord.)	29	Structural	Comb. Depletion and Water Drive	Spacing waived and General Rules No. 213 (Deviation), 218 (Commingling) and 219 (Dual Completion) are suspended until present Unit Agreement becomes inoperative. (Order 41-62.)	Waterflood of the Red River was commenced in August, 1967. (Order 3-66.) Minnesota water.
LITTLE BEAVER, EAST (Mont. Portion) Red River (Ord.)	14	Structural	Comb. Depletion and Water Drive	Same as for Little Beaver. (Order 42-62.)	Waterflood of the Red River was commenced in April, 1965. (Order 33-64.)
LOGGE GRASS Tensleep (Penn.)	3	Structural-Strat.	Water Drive	160-acre spacing units; well locations vary according to areas; 250' topographic tolerance. (Orders 26-64, 26-65.)	None
LOOKOUT BUTTE (Includes Coral Creek Unit) Madison (Miss.)	12	Structural	Water Drive	State-wide spacing.	Water disposal into Madison. (Order 68-62.)
Interlake, Red River (Sil.-Ord.)	22	Structural	Comb. Depletion and Water Drive	160-acre spacing; well location in center of $SE\frac{1}{4}$ of each quarter section with 150' topographic tolerance. (Order 21-62.) Coral Creek Unit not subject to spacing rules. Re-delineated per Order 7-63.	Waterflood of Silurian-Ordovician approved in 1966. (Order 35-66.) Water from Minnesota.
MACKAY DOME Greybull (L. Cret.) Gas & Oil	2	Structural	Depletion and Water Drive	State-wide.	Bottom-hole heat, (steam).
MASON LAKE Lakota (L. Cret.)	2	Structural	Water Drive	State-wide.	None
MELSTONE Tyler (Penn.)	4	Structural-Strat.	Depletion	State-wide.	None
MIDDLE BUTTE Blackleaf (Cret.) Gas (Bow Island)	3	Structural	Volumetric	320-acre spacing units consisting of $E\frac{1}{2} & W\frac{1}{2}$ of each section; well location in center of either of the inside quarter-quarter sections located in $E\frac{1}{2}$ of each spacing unit. 75' topographic tolerance. (Order 3-60.)	None
	2				

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
MINERAL BENCH Duperow (Dev.)	1	Structural	Water Drive	State-wide.	Water disposal into Dakota-Lakota per Order 18-65.
MINERS COULEE Sunburst (L. Cret.)	1	Strat.	Depletion	40-acre spacing units consisting of quarter-quarter sections; well location no closer than 330' from lease or property line and 660' from any other well. (Order 9-66.)	None
Swift (U. Jur.)	3	Strat.	Depletion		
Madison (Miss.)	1	Strat. ?	Water Drive		
MONARCH Mission Canyon (Miss.)	2	Structural-Strat.	Water Drive	80-acre spacing units consisting of east and west halves of quarter section. Well location in SW $\frac{1}{4}$ & NE $\frac{1}{4}$ of quarter section. Location within 660' square at center of quarter-quarter section. (Order 18-61.)	Produced water is disposed into the salt water disposal system for the Pennel Field.
Interlake, Red River (Sil.-Ord.)	14	Structural-Strat.		160-acre spacing units consisting of a quarter section; well location in center of SW $\frac{1}{4}$ of each quarter section with 175' topographic tolerance. (Orders 12-59, 4-63.)	
MOSBY (See Cat Creek)	15	Structural-Strat.	Water Drive	Listed as part of Cat Creek.	Waterflood, 2nd Cat Creek sand. (Order 8-68.)
MOSSER Greybull (L. Cret.)	4	Structural	Water Drive	Spacing waived. Future development required administrative approval of the Commission. (Order 27-62.)	None
MT. LILLY Madison (Miss.) Gas	2	Structural	Water Drive	640-acre, well location in approximate center of any of the four quarter-quarter sections adjoining center of section; 250' topographic tolerance. (Order 37-63.)	None
NORTH LAKE BASIN (See Lake Basin, North)					
OUTLOOK Mission Canyon (Miss.)	1	Strat.	Water Drive	State-wide spacing.	Produced water is disposed into Dakota and Siluro-Devonian formations. (Orders 16-59, 17-65, 36-66.)
Duperow (Dev.)	2	Strat. and Structural	Water Drive	State-wide spacing.	
Silurian-Devonian	8	Strat. and Structural	Water Drive	160-acre spacing units; well location in center of either SW $\frac{1}{4}$ or NE $\frac{1}{4}$ of each quarter section; 175' topographic tolerance. (Order 19-59A.)	

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
OUTLOOK, SOUTH Winnipegosis (Dev.) Interlake (Sil.) (Dual completion with Dev. zone)	1	Structural	Water Drive	160-acre spacing; permitted wells in either SW $\frac{1}{4}$ or NE $\frac{1}{4}$ of quarter section; 175' topographic tolerance. (Order 19-59A.) Commingleng permitted. (Order 45-64.)	Produced water disposed into Muddy and Dakota formations. (Orders 19-59, 17-65.)
OUTLOOK, WEST Winnipegosis (Dev.)	1	Structural	Water Drive		
	2	Structural	Water Drive	160-acre spacing units consisting of quarter sections; permitted wells in either SW $\frac{1}{4}$ or NE $\frac{1}{4}$ with a tolerance of 175'. (Order 7-67.)	Produced water disposed into Dakota formation. (Order 42-66.)
PENNEL Mission Canyon (Miss.) Lodgepole (Miss.)	8	Structural	Water Drive	(Miss.) 80-acre spacing units consisting of east and west half of quarter section; wells located in center of SE $\frac{1}{4}$ and NW $\frac{1}{4}$ of quarter sections with 150' topographic tolerance. (Order 15-61.)	Produced water is being injected into Dakota, Siluro-Ordovician and Madison formations. (Orders 16-60, 46-62, 68-62, 36-63, 13-64.) Waterflood approved Nov. 1968. (Order 24-68.)
Siluro-Ordovician Oil & Gas	130	Structural	Comb. Depletion and Water Drive	80-acre spacing units on west side and 160-acre spacing units on east side of pool. Wells to be located in SE $\frac{1}{4}$ and NW $\frac{1}{4}$ of each quarter section (80 acres) and in SE $\frac{1}{4}$ of each quarter section on 160-acre spacing. (Orders 1-56, 8-56, 15-61, 20-62, 4-63, 7-63.) Commingleng approved. (Order 59-62.)	
PINE Mission Canyon (Miss.) Oil & Gas	1	Structural	Water Drive	Spacing and General Rules 213, 218 and 219 are waived within the Pine Unit. 80-acre spacing units outside of unit area; well location in NW $\frac{1}{4}$ and SE $\frac{1}{4}$ of quarter section; 150' topographic tolerance. (Order 37-62.) Gas through extraction plant.	A waterflood program for the south area was started in 1959. A waterflood of the north area was approved in 1967. (Orders 13-68, 1-60, 8-62, 32-67.)
PLEVNA Eagle, Judith River (U. Cret.) Gas	29	Structural	Water Drive	1200' from legal subdivision line; 2400' from other wells on same lease or unit; 75' topographic tolerance. (Orders 34-54, 4-57.)	None
POLE CREEK Amsden (Penn.)	1	Structural	Water Drive	State-wide.	None

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
PONDERA Sun River (Miss.) Oil & Gas	281	Structural and Strat.	Comb. Depletion and Water Drive	Oil: 220' from legal subdivision, 430' from other wells in same reservoir on same lease; 75' topographic tolerance. Porter Bench Extension: 330' from legal subdivision line; 650' from other wells in same reservoir on same lease or unit; 75' topographic tolerance. (Order 9-54.) Gas: 1320' from legal subdivision line; 3700' from other wells on same lease or unit; 75' topographic tolerance. (Order 9-54.) General Rules 207, 211, 219, 221, 223, and 224 do not apply.	Produced water injected into lower Madison. (Orders 11-56, 15-56, 4-65, 4-66.) A small waterflood project has been in operation since 1959, using Madison water.
POUNDERA COULEE Sun River (Miss.) (Shut-in)	4	Structural	Water Drive	330' from legal subdivision lines or upon a 10-acre spacing pattern; 75' topographic tolerance. (Order 5-62.)	None
POPLAR, EAST Madison (Miss.) (Charles & Mission Canyon fms.)	61	Structural	Water Drive	State-wide spacing; field delineated by Order 7-55, 33 shut-in oil wells, 6 shut-in gas wells.	Excess produced water has been injected into the Dakota and Judith River formations. (Orders 1-55, 5-57, 7-57, 14-61, 21-61, 34-61, 10-62, 51-67.)
POPLAR, NORTHWEST Charles (Miss.) ("C" or McGowan Zone)	5	Structural	Water Drive	80-acre spacing units consisting of E½ and W½ of each quarter section; permitted wells in NW¼ and SE¼ of quarter section. 75' topographic tolerance. (Order 18-55.)	None
RAILROAD Charles "C" (Miss.)	1	Unknown	Water Drive	State-wide.	None
PRAIRIE ELK Shannon (U. Cret.) Gas	7	Structural-Strat.	Depletion	State-wide.	None
RAGGED POINT Tyler (Penn.) (2 Sands)	12	Strat.	Depletion	40-acre spacing units; 75' topographic tolerance. (Order 8-59.) Spacing waived for Tyler "A" sand reservoir within Tyler "A" Sand Unit except no well can be closer than 660' to Unit boundary. (Order 35-65.)	A waterflood project of the Tyler "A" sand was commenced in February, 1966, using Third Cat Creek sand water. (Order 35-65.) Water disposal into Kibbey. (Order 19-65.)

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
Kibbey (Miss.)	1	Structural	Water Drive	State-wide spacing. (Order 15-54.) Commingling of production from Tyler and Kibbey permitted in one well per Order 11-65.	None
RATTLESNAKE COULEE Sunburst (L. Cret.)	1	Strat.	Depletion	State-wide.	None
REAGAN Sun River (Miss.)	Oil 48 Gas 1	Structural	Comb. Gas Cap and Water Drive	State-wide. Two shut-in oil wells. (Order 17-54.)	A pressure maintenance project utilizing gas injection was started in 1961. (Order 21-60.)
RED CREEK Cut Bank (L. Cret.) Oil & Gas	9	Strat.	Depletion	40-acre spacing units; wells in center of spacing unit with 75' topographic tolerance; spacing waived for unitized portion. (Orders 16-58, 73-62, 31-64.)	Excess produced water injected into Bow Island and Madison. (Orders 22-63, 37-64.) A waterflood project in the Cut Bank sand was initiated in June, 1965, using Madison water.
Sun River (Miss.) Oil & Gas	17	Structural	Water Drive		
RED FOX Nisku (Dev.)	1	Structural	Water Drive	Field consists of one 160-acre spacing unit which straddles the section line. (Order 20-67.)	None
REDSTONE Winnipegosis (Dev.)	1	Unknown	Water Drive	One well per 160-acre unit, but no closer than 660' from unit boundary.	None
REPEAT Red River (Ord.)	1	Unknown	Water Drive	State-wide.	None
RESERVE Winnipegosis (Dev.)	3	Structure-Strat.	Water Drive	160-acre spacing units; permitted well within 1320' square in center of quarter section. Commingling of Red River and Interlake production permitted on individual well basis. (Orders 34-66, 27-67.)	None
Interlake (Sil.)		Structure-Strat.	Water Drive		
Red River (Ord.)	2	Structure-Strat.	Water Drive		

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
RICHEY Charles (Miss.)	1	Structural	Water Drive	80-acre spacing units consisting of any two adjacent quarter-quarter sections; well locations in center of NW $\frac{1}{4}$ and SE $\frac{1}{4}$ of each quarter section; 75' topographic tolerance. (Order 21-55.)	Part of produced water is being injected into the Dakota formation. (Orders 10-58, 19-61.)
RICHEY, SOUTHWEST Interlake, Dawson Bay (Sil.) (Dev.)	6	Structural	Depletion	160-acre spacing units; wells no closer than 900' from boundary of spacing unit. (Order 25-62.)	A waterflood project in the Interlake and Dawson Bay was started in 1965. (Order 34-65.)
ROSCOE Lakota (L. Cret.)	1	Structural	Water Drive	State-wide.	None
RUDYARD Sawtooth (M. Jur.) Gas	(Shut-in) 3	Structural	Volumetric	640-acre spacing units consisting of one section; well location in center of NW $\frac{1}{4}$ of section with 75' topographic tolerance. (Order 2-58.)	None
RUSH MOUNTAIN Winnipegosis (M. Dev.) Red River (Ord.)	2	Structural	Volumetric-Water Drive	State-wide. Dual zone completion in discovery well.	None
SAND CREEK Interlake, Red River (Sil.) (Ord.)	8	Structural	Water Drive	80-acre spacing units consisting of any two adjacent quarter-quarter sections. Wells located in center of NW $\frac{1}{4}$ and SE $\frac{1}{4}$ of each quarter section. (Order 16-59.) Commingling of production from Interlake and Red River authorized per Order 49-62.	Excess produced water is injected into the Swift formation. (Order 9-61.)
SHELBY AREA Sunburst (L. Cret.) Gas	51	Structural-Strat.	Depletion	State-wide. Field outline not delineated.	None
SHOTGUN CREEK Ratcliffe (Miss.)	1	Structural	Water Drive	State-wide.	None
SIDNEY-BRORSON (See Brorson and Brorson, South)					
SMOKE CREEK Charles (Miss.)	3	Structural	Water Drive	State-wide.	None

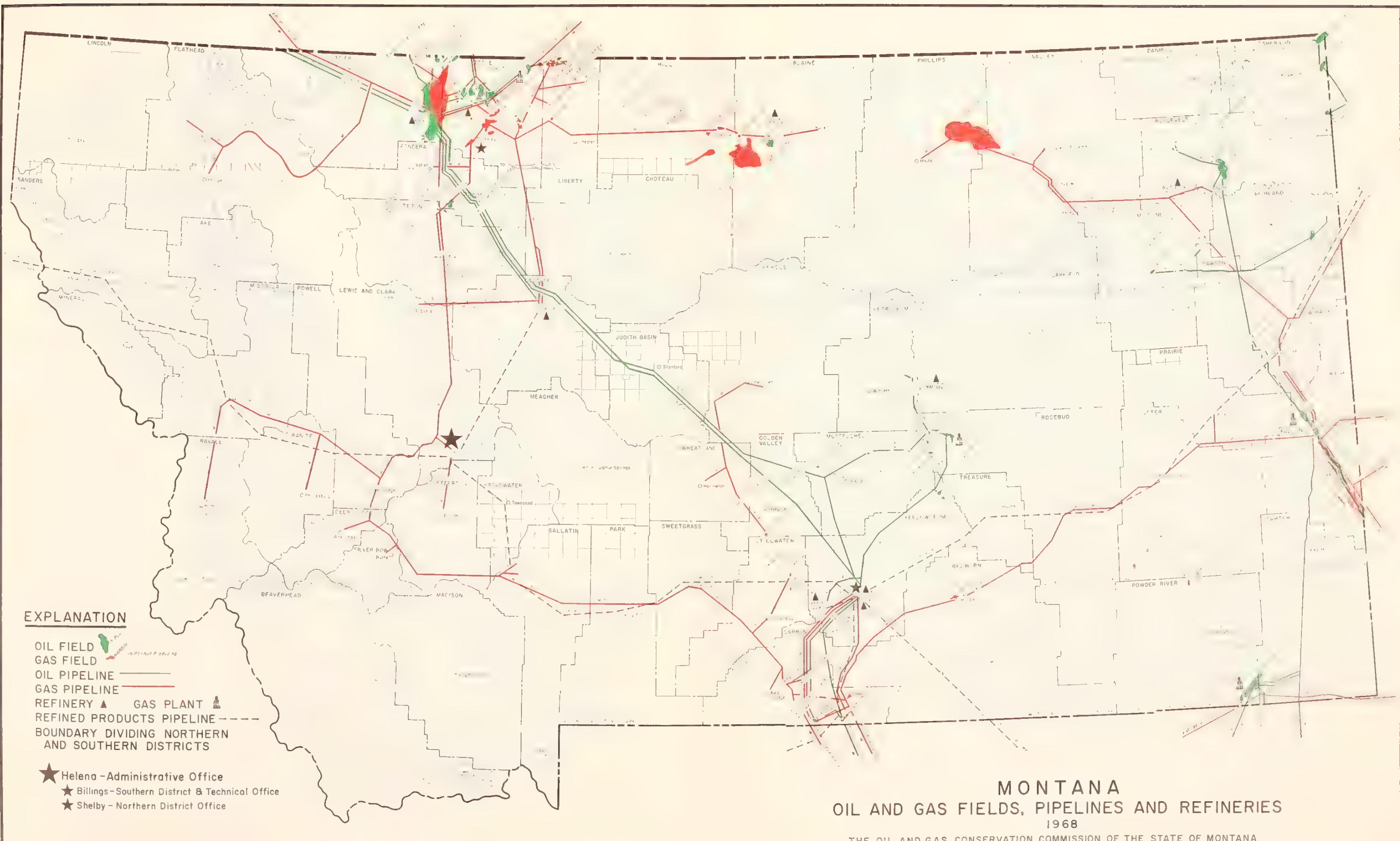
Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
SNYDER Tensleep (Penn.)	3	Structural	Water Drive	10-acre spacing units with center 5-spot permitted; 150' topographic tolerance. (Order 45-62.)	None
SOAP CREEK Tensleep, Amsden, Madison (Penn.) (Penn.) (Miss.)	18	Structural	Water Drive	One well per 10-acre spacing unit per production formation; well location in center of spacing unit with 100' topographic tolerance. (Order 26-60.)	None
SPRING LAKE Nisku (Dev.)	(Shut-in) 1	Structural	Depletion	One well per 160-acre spacing unit. Well location anywhere within 840' square in center of spacing unit. (Order 6-63.)	None
Red River (Ord.)	2	Structural	Depletion		
SQUAW COULEE Eagle (U. Cret.) Gas	5	Structural-Strat.	Volumetric	State-wide. In T. 32N., R. 15E., not delineated.	None
STENSVAD Tyler (Penn.)	15	Strat.	Depletion	40-acre spacing units; well location in center of spacing unit with 200' tolerance. (Orders 2-59, 7-60.) Wells may be drilled anywhere within waterflood unit boundary, no closer than 660' from unit boundary. (Order 5-65 Amended.)	A waterflood operation has been in progress since 1963, using Madison water. (Orders 53-62, 9-67.)
SUMATRA Tyler (Penn.) Oil & Gas Amsden (Penn.) (Plugged)	88	Strat. Strat. and Structural	Depletion Water Drive	40-acre spacing units; well located in center of unit with 75' tolerance. (Order 14-58.) Gas extraction plant in field.	N.W. Sumatra Unit waterflood approved in 1967, using Madison water. (Order 48-67.)
TIGER RIDGE Judith River (U. Cret.) Gas	1	Structure-Strat.	Depletion-Water Drive	State-wide.	None
Eagle (U. Cret.) Gas (Shut-in)	33	Structure-Strat.	Water Drive-Depletion	One well per section within 2640' square in center of each unit and no closer than 1320' from boundary of unit.	
Sawtooth (Jur.) Oil	1	Structure-Strat.	Water Drive	State-wide.	
TULE CREEK Nisku (Dev.)	6	Structural	Water Drive	160-acre spacing units with permitted well anywhere within 1320' square in center of each unit. (Orders 26-62, 6-65, 11-67.)	Produced water injected into Dakota & Judith River formations. (Orders 12-66, 24-67.)

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
TULE CREEK, EAST Nisku (Dev.)	2	Structural	Water Drive	160-acre spacing units with permitted well anywhere within 1320' square in center of each unit. (Orders 40-64, 6-65.)	Water injected into Judith River formation. (Order 13-68.)
TULE CREEK, SOUTH Nisku (Dev.)	3	Structural	Water Drive	160-acre spacing units with permitted well anywhere within a 1320' square in center of each unit.	Authority given to dispose of produced water into Dakota. (Order 44-64.) Into Judith River formation. (Order 29-67.)
UTOPIA (Under Ethridge Field)					
VIDA Interlake (Sil.)	2	Structural	Water Drive	160-acre spacing units with permitted well anywhere within an 840' square in center of each unit. (Order 39-63.)	Water injected into Lakota formation. (Order 14-68.)
VOLT Nisku (Dev.)	4	Structural	Water Drive	160-acre spacing units with permitted well anywhere within a 1320' square in center of each unit. (Orders 27-64, 6-65, 32-65.)	Excess produced water is disposed into Judith River. (Order 3-65.)
Charles "C" (Miss.)	1	Structural	Water Drive	State-wide.	
WEED CREEK Amsden (L. Penn.)	3	Structural	Water Drive	State-wide.	None
WELDON Kibbey (Miss.)	12	Structural	Partial Water Drive	80-acre spacing unit; each quarter section divided into two separate units running in either a north-south or east-west direction; well location in center of NE 1/4 and SW 1/4 of quarter section with 200' topographic tolerance. (Order 9-65.)	Excess produced water is disposed into the Dakota, Lakota, Morrison, and Charles formations. (Orders 31-65, 47-65, 37-66, 16-67.)
WEST BUTTE					
Sunburst (L. Cret.) Oil	1	Structural-Strat.	Depletion		None
Sawtooth (Jur.) Gas					
Madison (Miss.) Gas	2	Structure	Water Drive		

Field, Formation, Age	No. Prod. Wells	Type of Trap	Probable Drive, Mechanism	Spacing Regulations, Field Rules, and Remarks	Secondary Recovery or Water Disposal
WHITLASH Bow Island, Kootenai, Swift (Cret.) (Jur.)	Oil 29 Gas 38	Comb. Strat. and Struct.	Volumetric	Gas: 300' from legal subdivision line and 2400' between wells, 75' topographic tolerance. Oil: 330' from legal subdivision line and 650' between wells; 5-spot location at center of 40-acre tract permitted; 75' topographic tolerance. General Rules 207, 211, 219, 221, 223, and 224 suspended. (Order 16-54.)	None
WHITLASH, WEST Sunburst, Swift (Cret.) (Jur.)	Oil 1 Gas 9	Structural and Strat.	Volumetric	Gas: 160-acre spacing units consisting of quarter sections; well location anywhere within a 660' square in center of spacing unit. Oil: 330' from legal subdivision line, 650' between wells in same reservoir on same lease; 5-spot location permitted. (Order 61-62.)	None
WILLS CREEK, SOUTH Interlake (Sil.)	3	Structural	Partial Water Drive	160-acre spacing units. Well location in center of SE 1/4 of each unit with 175' topographic tolerance. (Orders 5-64, 30-66.)	None
WOLF SPRINGS Amsden (Penn.)	9	Structural	Water Drive	80-acre spacing units consisting of N 1/2 and S 1/2 of each quarter section. Well location in center of NW 1/4 and SE 1/4 of each quarter section with 75' topographic tolerance. (Orders 4-56, 9-59.)	None
WOODROW Charles, Duperow, Interlake Red River (Miss., Dev., Sil., Ord.)	4	Structural	Water Drive	80-acre spacing units consisting of any two adjacent quarter-quarter sections; well locations in center of NE 1/4 and SW 1/4 of each quarter section with 200' topographic tolerance. (Order 47-62.) One Charles well; One Interlake well; One commingled Interlake-Duperow well; One Red River well.	Produced water injected into Dakota. (Order 48-62.)

STATE OF MONTANA - SUMMARY OF PRODUCING OIL FIELDS

LINE NO.	FIELD (OR POOL)	COUNTY	YEAR DISCOVERED	PRODUCING FORMATION	APPROX. DEPTH	A.P.I. GRAVITY	VOLUME FACTOR	AVG. NET PAY FT.	AVG. POROSITY %	AVG. CONNATE WATER %	ORIGINAL OIL IN PLACE BBLS/ACRE	PRODUCTIVE AREA 1-1-69 ACRES	ORIGINAL OIL IN PLACE 1000 BBLS.	ESTIMATED RECOVERY FACTOR %	ORIGINAL RESERVES 1000 BBLS.	TOTAL ORIGINAL RESERVES 1000 BBLS.	CUMULATIVE PRODUCTION 1000 BBLS.	REMAINING RESERVES 1-1-69 1000 BBLS.	1968 PRODUCTION		ORIGINAL RECOVERABLE RESERVES BBLS./ACRE	ORIGINAL RECOVERABLE RESERVES BBLS./ACRE/FT.	LINE NO.	
																			PRIMARY	SECONDARY	1000 BBLS.			
1. Ash Creek (Montana)	Big Horn	1952	Shannon (U. Cret.)	4,500	34	1.05	14	22	42	13,199	200	2,640	25	6	660	158	818	619	199	38,747	106	4,090	292	1
2. Bears Den	Liberty	1924	Sunburst (L. Cret.)	2,300	39	1.08	20	12	35	11,205	200	2,241	17	--	381	381	326	55	15,551	42	1,905	95	2	
3. Bell Creek	Powder River	1967	Muddy (Cret.)	4,400	32	1.11	9.5	26.4	23	13,566	13,840	187,756	31	31	57,969	57,811	115,780	18,283	97,497	16,572,472	45,280	8,366	881	3
4. Banrud	Roosevelt	1961	Hisku (Dev.)	7,650	43	1.41	22	16	30	13,557	80	1,085	17	--	187	187	167	20	11,967	33	2,337	106	4	
5. Banrud, East	Roosevelt	1962	Hisku (Dev.)	7,500	46	1.37	25	15	30	20,811	160	3,330	38	--	1,256	1,256	833	423	100,267	274	7,850	224	5	
6. Banrud, Northeast	Roosevelt	1964	Hisku (Dev.)	7,620	46	1.40	45	15.5	30	27,054	160	4,329	18	--	780	780	651	129	90,016	246	4,869	108	6	
7. Big Wall	Musselshell	1948	Tyler (Penn.)	3,000	31	1.02	22	17	40	1,220	20,821	31	5	6,455	1,041	7,496	5,352	2,144	204,148	558	6,144	279	7	
8. Big Wall	Musselshell	1953	Amsden (Penn.)	2,500	19	1.61	17	16	35	8,517	280	2,385	24	--	625	625	546	79	26,092	71	2,232	132	8	
9. Blackfoot	Glacier	1955	Madison (Miss.)	3,550	25	1.15	8	14	40	4,533	480	2,178	32	--	696	696	--	1,023	130	33,423	91	1,450	181	9
10. Blackfoot	Glacier	1955	Cut Bank (L. Cret.)	3,500	30	1.11	15	15	35	10,221	160	1,635	20	--	327	327	--	2,044	136	2,044	136	10		
11. Bowes	Blaine	1949	Sawtooth (M. Jur.)	3,250	19	1.02	37	11.7	31	22,718	3,760	85,420	8	2	6,834	2,021	8,855	7,085	1,770	175,008	478	2,355	64	11
12. Bronson-Madison	Richland	1954	Madison (Miss.)	9,600	32	1.40	40	5	40	6,650	960	6,384	10	--	638	638	217	421	31,602	86	665	17	12	
13. Bronson-Red River	Richland	1968	Red River (Ord.)	12,600	48	1.70	20	10	35	5,940	960	5,707	20	--	1,140	1,140	337	803	196,658	1,311	1,188	59	13	
14. Bronson-South-Red River	Richland	1968	Red River (Ord.)	12,600	48	1.70	20	12	30	7,667	320	2,453	20	--	491	491	82	409	82,289	686	1,534	70	14	
15. Cabin Creek	Fallon	1953	Siluro-Ordovician	8,400	33	1.20	50	13	30	29,415	7,620	224,142	22	8	49,311	17,931	67,242	40,604	26,638	2,349,649	6,420	8,824	176	15
16. Cabin Creek	Fallon	1956	Mission Canyon (Miss.)	7,300	33	1.13	25	11	30	13,215	2,259	29,853	42	--	12,514	--	12,514	9,533	1,180,659	3,226	5,539	221	16	
17. Cat Creek (West Dome)	Petroleum	1920	Kootenai (L. Cret.)	1,100	52	1.10	51	21	19	--	975	59,650	25	9	14,913	5,369	20,282	16,723	3,559	91,270	249	20,802	408	17
18. Cat Creek (Antelope-Mosby)	Petroleum	1920	Garfield	1,225	52	1.10	10	21	19	11,997	200	2,399	22	11	528	264	--	1,783	396	1,960	396	18		
19. Cat Creek	Petroleum	1945	Garfield	1,600	52	1.10	6	22	40	5,586	240	1,340	32	--	428	--	6,249	4,531	1,718	250	1,783	97	19	
20. Cat Creek	Petroleum	1945	Garfield	1,750	52	1.10	25	18	40	19,050	880	16,764	30	--	5,029	--	5,029	5,715	1,718	5,715	229	20		
21. Cat Creek	Petroleum	1967	Amsden (Penn.)	2,025	52	1.00	10	8	30	4,344	40	174	20	--	35	35	11	24	10,240	28	875	88	21	
22. Cut Bank	Glacier, Toole	1932	Kootenai (L. Cret.)	2,900	18	1.09	18	15	35	12,492	49,000	612,108	20	11	122,422	67,332	189,754	107,483	82,271	3,673,177	10,036	3,873	215	22
23. Cut Bank	Toole	1945	Madison (Miss.)	3,000	39	1.10	10	14	30	6,811	3,200	22,115	28	--	6,192	6,192	5,736	456	118,313	323	1,935	194	23	
24. Deer Creek	Dawson	1952	Red River (U. Ord.)	9,900	41	1.20	80	7	30	28,530	400	11,412	10	--	1,130	1,130	1,043	87	24,225	66	2,825	31	24	
25. Deer Creek	Dawson	1956	Interlake (Sill.)	9,400	43	1.20	38	6	30	11,514	320	3,684	34	--	1,253	1,253	1,079	174	8,795	24	3,916	103	25	
26. Dwyer	Sheridan	1968	Mission Canyon (Miss.)	8,000	33	1.12	30	11.8	55	11,036	4,800	52,963	19	--	5,415	--	5,415	3,987	231,580	633	1,729	38	26	
27. Elk Basin (Montana Portion)	Carbon	1915	Frontier (U. Cret.)	1,200	45	1.16	30	21	20	33,720	120	4,046	44	--	37	37	1,500	1,316	1,282	47	12,500	417	27	
28. Elk Basin (Montana Portion)	Carbon	1942	Embar-Tensleep (Perm.-Penn.)	5,000	29	1.16	124	10.5	10	78,368	1,376	107,834	44	--	57	57	61,465	45,407	16,558	4,805	44,669	360	28	
29. Elk Basin (Montana Portion)	Carbon	1942	Madison (Miss.)	5,300	28	1.12	224	12	9	169,434	920	155,879	15	4	23,382	26,235	13,109	16,508	163,810	2,284	32,192	144	29	
30. Elk Basin, Northwest	Carbon	1947	Frontier (U. Cret.)	3,375	47	1.29	28	19	30	22,394	120	2,687	25	21										



GENERALIZED STRATIGRAPHIC CORRELATION CHART

SHOWING PRODUCTIVE FORMATIONS IN MONTANA OIL AND GAS FIELDS

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